CLAIMS

1. A method for joining a piconet in a wireless personal area network having a master and at least one slave unit, comprising the steps of:

at the Master unit:

(a) transmitting a Permit frame containing a broadcast field (RA field) and a transmit field (TX_Mini field) whose value is an integer multiple ("i") of the number of minislots needed for transmitting an identification (ID) frame;

at the Slave unit;

(b) waiting to receive the Permit frame at the slave unit;

(c) partitioning the number of minislots specified in the transmit field (TX_Mini field) into a number of adjoining groups each having "i" consecutive minislots once the Permit frame has been received; and

(d) transmitting its ID frame using a randomly chosen group of minislots out of those adjoining groups.

2. A method of joining a piconet as defined in claim 1, further comprising the step of:

at the Master unit:

(e) admitting the slave unit into the piconet if the master successfully receives the ID frame out of one of the groups of minislots transmitted by the slave unit.

3. A method of joining a piconet as defined in claim 2, wherein if the master unit detects one or more collisions in the said group of minislots received in step (e) of claim 2, it will within a predetermined time limit:

(f) transmit another Permit frame containing a broadcast field (RA field) and a transmit field (TX_Mini field) whose value is chosen for a rapid resolution of the collisions.

4. A method of joining a piconet as defined in claim 3, further comprising the step of:

(f) repeating steps (b) - (f) until no more collisions are detected by the master unit or the master unit decides to suspend the issuance of Permit frames.

5. A method of joining a piconet as defined in claim 4, wherein the master unit suspends the issuance of Permit frames even if other slave units are attempting to join the piconet.

6. A method for providing efficient channel access using a medium access control (MAC) protocol for use in wireless networks having one master and a plurality of slave units, the method comprising the steps of:

transmitting a first frame (M-Permit frame) from the master unit, the first frame provides information to one or more slave units from amongst the plurality of slave units addressed by the first frame on the maximum transmission time in minislots each one of the one or more slave units may transmit in sequence after the reception of the first frame; and

transmitting a second frame (Permit frame) from the master unit, the second frame is addressed to a particular slave unit from amongst the plurality of slave units and provides information to that particular slave unit on the maximum transmission time it has in minislots following reception of the second frame.

7. A method as defined in claim 6, wherein the minilslots each comprise a frame transmission time unit which is smaller than the size of a slot used by units compliant with the IEEE 802.15.1 standard.

8. A method as defined in claim 7, wherein there are a predetermined number of minislots and interframe spaces (IFS) per slot.

9. A method as defined in claim 7, wherein the slave units can perform frame transmissions across multiple minislots with no interframe spaces (IFS) in between the multiple minislots.

10. A method as defined in claim 7, wherein the MAC protocol is backward compatible with and supports legacy IEEE 802.15.1 compliant slave units using slots as frame transmission time units.

11. A method as defined in claim 7, wherein the master unit controls the allocation of minislots to the plurality of slave units.

12. A method as defined in claim 7, wherein two of the slave units from amongst the plurality of slave units can communicate directly with each other.

13. A method as defined in claim 7, further comprising the step of:

transmitting a data-no-acknowledgment (Data-NoAck)/data-acknowledgment (Data-Ack) frame having a field (TX_Mini/More) that when transmitted by the master unit provides to the slave unit receiving the transmission a piggybacked permit of the maximum transmission time in minislots allowed for the slave receiving the frame.

14. A method as defined in claim 13, wherein the field (TX_Mini/More) is used by the slave unit that received the data-no-acknowledgment (Data-NoAck)/data-acknowledgment (Data-Ack) frame when transmitting to the master unit as a piggybacked indication by the slave unit of whether there are more data waiting at this slave to be transmitted.

15. A method as defined in claim 14, wherein when used as a piggybacked indication by the slave unit the field (TX_Mini/More) provides information to the master unit if whether or not there is data waiting to be transmitted and if so, the highest service priority of the data waiting to be transmitted.

16. A medium access control (MAC) protocol for use in wireless networks, the MAC protocol is backward compatible with IEEE standard 802.15.1 wireless devices, the MAC protocol providing a method of efficient communications and including a master unit and a plurality of slave units, the method comprising the steps of:

allowing one or more slave units from amongst the plurality of slave units that only support the IEEE standard 802.15.1 to use slots as frame transmission time units; and

allowing one or more slave units from amongst the plurality of slave units to use minislots which are smaller than the slots as their frame transmission time units.

17. A method as defined in claim 16, wherein the master unit transmits a first type of frame (Permit frame) to a slave unit amongst the plurality which provides information to that particular slave unit on the maximum transmission time it has in minislots following reception of the first type of frame.

18. A method as defined in claim 16, wherein the slave unit can perform frame transmissions across multiple minislots with no interframe spaces (IFS) in between the multiple minislots.

19. A wireless network, comprising:

a master unit;

a plurality of slave;

the master unit transmits a first frame (M-Permit frame) that provides information to one or more slave units from amongst the plurality of slave units addressed by the first frame on the maximum transmission time in minislots each one of the one or more slave units may transmit in sequence after the reception of the first frame; and

the master unit transmits a second frame (Permit frame) that is addressed to a particular slave unit from amongst the plurality of slave units and provides information to that particular slave unit on the maximum transmission time it has in minislots following reception of the second frame.

20. A wireless network as defined in claim 19, wherein the minilslots each comprise a frame transmission time unit which is smaller than the size of a slot as defined by the IEEE 802.15.1 standard.

21. A wireless network as defined in claim 19, wherein there are a predetermined number of minislots and interframe spaces (IFS) per slot and the plurality of slave units can perform frame transmissions across multiple minislots with no interference spaces (IFS) in between the multiple minilsots.